

INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference P045409PCT DVR/jdo	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/NL 03/00602	International filing date (day/month/year) 28.08.2003	Priority date (day/month/year) 28.08.2002
International Patent Classification (IPC) or both national classification and IPC B63B39/06		
Applicant VAN OOSSANEN & ASSOCIATES B.V. et al.		



1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

I	<input checked="" type="checkbox"/>	Basis of the opinion
II	<input type="checkbox"/>	Priority
III	<input type="checkbox"/>	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	<input type="checkbox"/>	Lack of unity of invention
V	<input checked="" type="checkbox"/>	Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	<input type="checkbox"/>	Certain documents cited
VII	<input type="checkbox"/>	Certain defects in the international application
VIII	<input type="checkbox"/>	Certain observations on the international application

Date of submission of the demand 16.01.2004	Date of completion of this report 01.12.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer De Sena Hernandorena Telephone No. +31 70 340-2704 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/NL 03/00602**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-2 received on 12.05.2004 with letter of 11.05.2004

Claims, Numbers

1-6 received on 12.05.2004 with letter of 11.05.2004

Drawings, Sheets

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
 - ☐ the language of publication of the international application (under Rule 48.3(b)).
 - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:
- ☐ contained in the international application in written form.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority in written form.
 - ☐ furnished subsequently to this Authority in computer readable form.
 - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
 - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/NL 03/00602**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-6
	No: Claims	
Inventive step (IS)	Yes: Claims	1-6
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-6
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/NL 03/00602

The application refers to the field of monohull ships having a submerged foil to improve its hydrodynamic performance.

The closest state of the art is considered to be the document FR 1541693 which discloses a ship of the above mentioned kind and that has a transverse foil at the aft section.

The foils produce an upwards lift but fails to provide a more efficient propulsion.

An improvement is provided by the features of claim 1, namely by placing the foil at a longitudinal position and an downward tilt angle such that its interaction with the small hull sectional area produces a forward and upward lift.

Such a combination of features is neither disclosed nor suggested in the available prior art and therefore, the application fulfills the requirements of novelty and inventive step of Articles 33(2) and 33(3) PCT.

12.05.2004

(105)

The present invention relates to a vessel with a single hull according to the preamble of claim 1. Such a vessel is known from FR-A-1.541.693. This specification relates to a hydroplane vessel with sails. In particular, planing vessels are sometimes provided near the end with a foil or flap extending below the hull, in order to ensure that during planing the trim angle that the hull forms with the surface of the water is limited. Such planing vessels generally have a hull that does not change substantially from the middle part in the aft direction.

An example of such a construction is found in US 2.832.304; 4.915.048 and the Abstract of Japanese Patent Application 62008893. In these cases the foil is situated on the aft side of the vessel, and a downward force is generated. Such vessels have no constriction of the submerged part of the vessel, in other words the cross section of the submerged part of the vessel (perpendicular to the direction of movement of the vessel) does not increase in the aft direction.

Furthermore, some catamarans are provided with fins for the purpose of reducing ship movements in waves. Such fins do not, however, have a foil profile. An example of the use of these fins in a boat is found in US-A-3.208.422.

FR 1.541.693 discloses a hydroplane having a foil at the rear end thereof. This foil is arranged to only provide a vertically upward directed force.

The present invention relates to a non-planing vessel such as a sailing boat or a motor-driven vessel. It can be a relatively small vessel such as a leisure vessel or a large vessel such as a tanker, container ship and the like. Such vessels are provided with a constriction, in other words the cross-sectional surface area decreases in the longitudinal direction of the vessel, viewed in the aft direction. Such a reduction of the cross-sectional surface area is at least one third, and is normally approximately 50% from the point with the largest cross-sectional surface area of the submerged part of the vessel to the point with the smallest cross-sectional surface area of the submerged part of the vessel. At the position of a constriction the flow of the water will be directed upwards and/or inwards.

More particularly, in the case of such vessels the transom is not submerged in the water, but lies above the waterline.

It is the object of the present invention to improve the sailing characteristics of such a vessel.

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This aim is realised in a vessel of the type described above having the characterising features of claim 1.

The terms length, breadth etc. are used in this description. These terms are associated with the position of the vessel in the water while it is being propelled in the usual direction. The direction of propulsion is the longitudinal direction in this case.

According to the present invention, a foil (profile) is provided near the place where the greatest flow constriction occurs. This foil is arranged in such a way that, apart from an upward lifting force, a forward propulsion force is provided. This propulsion force manifests itself by faster travel in the same conditions or by reduced fuel consumption, or by both of these.

According to an advantageous embodiment of the invention, the distance from the foil to the hull is substantially constant over its full breadth. In other words, the foil follows the shape of the hull precisely at a distance that does not vary.

The foil preferably extends over the greatest possible part of the "breadth" of the hull. In practice, this means that in the normal vertical position of the vessel the foil extends until close to the waterline.

It will be understood that this does not necessarily have to be the case in relatively broad vessels such as some types of merchant vessels, for example large oil tankers or container ships. The fact is that in these cases the length of the foil below the hull is already such that the part of it extending to the waterline would make only a small contribution to the effect described above.

The breadth of the foil is, however, important in the case of smaller vessels such as sailing vessels.

Unlike the structure in the prior art, where the foil is used during planing and in that case can be moved between a position for planing and an ordinary sailing position, according to an advantageous embodiment of the invention, the foil according to the present invention is arranged immovably on the hull, and the distance from and orientation in relation to the hull is invariable.

According to an advantageous embodiment of the invention, the length of the foil, in other words the size in the longitudinal direction of movement of the vessel, is at least 50% of the distance from the hull and is no more than 150% of said distance.

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Claims

(105)

1. Vessel (1) with a single hull (2), the aft part (4) of which has a smaller water displacement and less breadth lying in the water than the middle part (7), and provided with a foil (10) extending below the waterline, wherein said foil (10) extends substantially transversely to the longitudinal axis (8) of said vessel, at the position of the greatest flow constriction of said vessel caused by said reducing water displacement, lying at a distance (a) below the hull over a breadth (b) comprising at least half the breadth of said hull at the position of the greatest flow constriction of said vessel caused by said reducing water displacement, characterized in that said foil is designed in such a way that during the forward movement of the vessel it exerts a forward propulsion force on said vessel, in that the local flow is directed obliquely upwards (and backwards), a lifting force being present being not directed purely vertically but slightly forward of which the resultants have a component in the forward direction
2. Vessel according to Claim 1, in which the distance of said foil from said hull is substantially constant over the entire breadth.
3. Vessel according to one of the preceding claims, in which said foil extends to the waterline (6).
4. Vessel according to one of the preceding claims, in which the position of said foil relative to said hull is fixed.
5. Vessel according to one of the preceding claims, in which the length (L) of said foil is at least 50% of the distance (a) of said foil from the hull.
6. Vessel according to one of the preceding claims, in which the length of said foil decreases in the outward direction from the longitudinal axis (L_1).

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